Coluccio, Tina (DNRE)

From: Thomas, Chuck (DNRE)
Sent: Tuesday, March 23, 2010 2:55 PM
To: Coluccio, Tina (DNRE)
Subject: FW:
Attachments: DRAFT COMMENTS BY LAM AND TAFT.doc

For the Humboldt file

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From: Taft, Bill (DEQ)
Sent: Thursday, January 14, 2010 11:04 AM
To: Maki, Joe (DEQ); Casey, Steve (DEQ); Ringuette, Lindsey (DEQ); Thomas, Chuck (DEQ)
Cc: Lam, Alvin (DEQ)
Subject:

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DRAFT COMMENTS BY LAM AND TAFT
1/14/10
THEY NEED TO BE REVIEWED BY CASEY/MAKI/RINGETTE/THOMAS

My comments still need to be seen by Brenda Sayles so we might make need to be modified

Steve/Joe/Lindsey – these are my draft comments that you should look over. There are a few questions in ( ) that I have at the end of some of the responses. They deal with required plans (i..e. monitoring or stormwater) that have to be submitted or agreed upon by the department and the permittee. **Question 36 and 37 are tough because it is hard to find the questions among the comments**.

34. Comment: The HTDF Hydrologic and Geochemical Mass Balance Model Report only consider "an even influent flow into to the WWTP." Of course, flow to the WWTP will not always be "even." WWTP maintenance, unplanned events and weather all will necessitate "uneven" flows not considered by Kennecott's modeling.

Response: ***The waste water treatment plant is not "volume dependent" and the treated effluent will be required to meet our strict chronic toxicity limits and metals limits for copper, nickel and selenium before entering Wetland EE. The company has the ability to vary the water level within the HTDF so maintenance can be planned and water storage of additional water made possible.*** **(Is there information in the application that discuss water level capacity of the pit or there ability to store water for a length of time).**

35. Comment: "Turnover" of water in the Lake was not considered in the EIA, even though DEQ itself has identified that as an issue. The company is relying of chemical and thermal stratification of the water and apparently plans to treat only the uppermost portion of the Lake, relying on stratification completely and forever. This sets a precedent of allowing deep water bodies to be polluted at the bottom, if water at the top is purportedly clean. This negligent approach to water quality flies in the face of the letter and spirit of Part 632, the Clean Water Act and other applicable laws.

Response: ***The current limnological conditions within the Humboldt Pit (a past mining disposal site) is currently as you have described above based upon our 2009 Lorax Environmental Report. It is currently chemical and thermal stratified with anoxic conditions that allow the hypolimnion to be chemically different that the above surface waters. It should be noted that many deep "natural lakes" throughout Michigan and the United States are thermally stratified and have similar extreme anoxic conditions below their thermocline during the summer season. The difference is that the***

Humboldt facility has been determined to be a mine disposal treatment pond and will be regulated as such.

36.Comment: Stratification and turnover of lakes, including deep pit lakes, has been and is currently under study at various existing and proposed sites. For example, the Draft EIS for the proposed PolyMet mine in Minnesota includes a detailed turnover analysis. Attachment 1. In the PolyMet study, pit lakes of similar depth to that of this Lake, turned over. Kennecott's turnover prediction relies on data gathered on one day in May 2007 and one day in July 2007. The prediction of and reliance upon permanent stratification, based on two data points is unfounded and does not lead to the conclusions cited by Kennecott. Numerous studies of pit lake limnology and turnover are available.

> Castendyk Devin N.; Webster-Brown Jenny G. Sensitivity analyses in pit lake prediction: Relationship between turnover and input water density Martha Mine, New Zealand; Chemical Geology: Vol. 244, pp. 42-55 (2007).
>
> Thomann, R.V. and J.A. Mueller. Water Quality Dynamics of Pit Lakes, Principles of Surface Water Quality Modeling and Control; Harper Collins, New York, NY (1987).

Much of the literature indicates that pit lakes as deep as the Lake experience whole or partial mixing. Despite the complexity of the issue, Kennecott's application does not provide critical information relevant to a serious assessment, nor a serious assessment of the probability of turnover, full or partial mixing. App. D to Vol. I, MPA, concludes on p. 12, that "the HTDF may theoretically mix completely" and that it is "unlikely" that it will mix completely. However, without complete mixing being ruled out, the mining plan, particularly the WWTP, must be able to handle a complete mixing situation and complete mixing must be analyzed in the EIA.

Additionally, ground water from the Quaternary system flows into the Lake (App B-1 and I). Depending on how much water and where it enters the Lake, this may induce turnover and the oxidation of additional acid-generating tailings, but these potential impacts are not fully considered in the EIA as they must be.

Response: ***A major component of the HTDF treatment train is the construction of a WWTP. This was a major conclusion in the executive summery in the 2009 Lorax Environmental Report that evaluated the modeling and limnology of the pit. The company did run the complete mixing scenario in there application submittal.***

37.Comment: The creation of sulfuric acid and the liberation of dissolved toxic metals from the oxidation of sulfide metallic minerals are well known phenomena in both scientific and public communities. Knowledge of the

impacts from these industrial activities arises from the historic mishandling of these mined minerals and particularly, the improper disposal of waste products from processing these sulfide metal minerals. It is also known that the severe environmental consequences which result from oxidation of these minerals is long term and very difficult to stop once it begins due to the large scale and areal extent of these reactions and the need to control the geologic process which drive the reactions. The disposal of sulfide metal minerals in the Humboldt lake ***must*** be carried out with the goal of absolute minimization of the creation of dissolved metals which remain mobile in the environment indefinitely.

A year ago in December 2008, KEMC submitted the Humboldt Mill Mining Permit Application (MPA) to the MDEQ. In the MPA, KEMC was insistent that the disposal would not only be sub aqueous disposal but would be anoxic disposal in the oxygen depleted bottom layer of the lake. In the MPA, there are several examples of KEMC justifying the tailings disposal based on the anoxic conditions: "To eliminate the potential for the sulfides in the tailings to oxidize, the tailings generated from the milling process will be placed in the anoxic environment that exists in the HTDF." (MPA, Section 4.1.2, pg 25); and "As discussed in Section 4.1.1.2, waters at depth in the HTDF are anoxic. Placing the tailings at the base of the HTDF will minimize potential oxidation of the tailings thereby minimizing long term impacts on the quality of water discharging from the HTDF. (MPA, Sect. 4.1.2.1, pg 26)

Less than a year later, KEMC is justifying the disposal of tailings in oxygenated water, not anoxic water. Information provided to EPA/FWS indicates that KEMC is no longer claiming the anoxic bottom layer will stay in tact and is now defending simply the sub aqueous disposal even in oxygenated water. Statements in KEMC's response to EPA/FWS makes several references to how much better sub-aqueous tailings disposal is compared to disposal in air to make it appear much better than air but has abandoned defense of the subaqueous disposal in anoxic conditions in which oxygenated sub-aqueous disposal fairs far worse by comparison: "As a result, storage under permanent water cover is perhaps the single most effective measure that may be taken to inhibit acid generation from sulfidic tailings **regardless of whether the water is anoxic or fully oxygenated**." (emphasis added); and "... anoxia at depth is an added benefit, but ... is not a required condition for successful subaqueous tailings disposal because sulfide minerals oxidize extremely slowly when submerged under oxygen bearing waters." (KEMC to EPA, pgs. 4 & 5).

Besides the obvious implication that KEMC is backing down on previous claims of minimizing environmental impacts by placement of the reactive sulfide mineral tailings in the anoxic layer, there are implications for the contamination levels that will be present in the disposal lake. Appendix B of KEMC's application for a permit under Part 301, Inland Lakes and Streams, provides a

model for chemical concentrations in the disposal lake in the event of complete mixing. KEMC indicates this is the "worse case" scenario. Several of these expected concentrations, including those for barium, cobalt, copper, iron, lead, manganese, mercury and nickel exceed the fresh water chronic screening values for aquatic life. KEMC represents that they will treat the disposal lake water before discharge to the wetlands but has no regards for impacts to the disposal lake itself, its aquatic life or the wildlife receptors further up the food chain.

KEMC attempts to justify these serious violations with a series of rationalizations of why poisoning bald eagles and other picivorous wildlife doesn't matter: "...concentrations under the conservative and unlikely complete mix scenario are high enough that it would not be expected that fish would survive *under those conditions, removing the food supply from the HTDF."* (KEMC's response to USEPA/FWS, pg. 8 & 9). Further rationalization is provided based on the water depth "...bald eagle foraging success is greatest in shallow water. The steep walls of the HTDF do not provide sufficient shallow water habitat to promote frequent bald eagle foraging success." and on distance to the nearest active nest at Lake Lory, even though it is only 1.2 miles away, "...[brooding pairs] would not fly the distance to the HTDF." and "...during winter eagles exhibit a large foraging range of some 4,000 to 5,000 acres. ...the 65 acre HTDF represents a very small proportion of surface water within the entire range, and that small range is not expected to have substantive fish populations for consumption." Even if these questionable reasons for allowing poisoning of fish were accepted, how can the MDEQ allow the potential poisoning of such a high profile endangered and threatened species as the bald eagle?

Response: ***Like sewage lagoons, industrial cooling ponds, etc., the HTDF has been determined to be a disposal site and is not considered 'waters of the state". It currently has a very limited fish population (mostly minnow species) due to low pond productivity and lack of littoral habitat. The current water quality in the upper 100 feet is quite good. This site is a poor foraging area due to the overall lack of prey items. Conversely, there are more productive water bodies in the area that present far better foraging opportunities such as Greenwood Reservoir, Lake Michigamme, and Deer Lake.***

But is the complete mix scenario conservative and unlikely as claimed? As discussed above, KEMC is defending the disposal of tailings in fully oxygenated water. Isn't this what complete mixing of the lake represents?

There are several reasons why the chemocline and thermocline static layers in the lake measured by KEMC can not be construed as "permanently stratified". First, the proposed disposal lake has been undisturbed for 20 years since the end of discharge of Ropes tailings into the lake. This has given chemical and

thermal differences plenty of time to stratify. But as we know, this all will change if he permits are granted. KEMC proposes to discharge over 13,000 cu. ft. of slurry deep in the bottom layer of the disposal lake each day while at the same time pumping over 13,000 cu. ft. of water from the lake's surface layer each day. This will set up currents within the disposal lake which will disturb the "static" oxygenated and anoxic layers KEMC claims characterizes the present lake.

In addition, the water component of the 13,000 cu. ft. per day of the tailings slurry will contain highly oxygenated water as is characteristic of pumped water. This will inject dissolved oxygen into the deep bottom layer changing the anoxic nature of this layer of the lake. The slurry oxygenated water will be augmented by oxygen in surface runoff water, precipitation and ground water discharge into the lake, all natural sources of highly oxygenated water. KEMC contends the production of acid and dissolved metals (acid mine drainage) will be limited to the available oxygen as if the water only contains a finite amount. "Unless oxygen is present in at least the minimum stoichiometric excess over sulfides, it will be the limiting reagent in an aqueous system." (KEMC's response to USEPA/FWS, pg. 4) In light of the continuing sources of dissolved oxygen noted above, there will always be a stoichiometric excess over the sulfide tailings. Granted, the natural sources of dissolved oxygen will enter the system at shallower depths but other factors affecting lake turnover, including salinity/density differences, summer heating of the epilimnion surface layer, ice formation, wind and storms, all make it highly ***unlikely*** that the disposal lake will remain static and separated into oxygen bearing on top and oxygen depleted on the bottom.

The serious and irreversible impacts of improper disposal of sulfide metallic mineral processing waste demand that the design of the Humboldt waste disposal be done correctly. The Community is not convinced that the best and most relevant technology is being applied to the methods KEMC proposes to use for this disposal. The MDEQ can not issue permits for the creation and disposal of such a large volume of reactive waste based on what has been presented by KEMC thus far.

Response: ***The State of Michigan contracted with Lorax Environmental Services from Vancouver, British Columbia to conduct a technical review of the mine tailing disposal process. They are North American experts in the field of aquatic mining disposal. Their report and executive summery (dated September 1, 2009) concluded that the HTDF is a suitable tailing repository and is considered a best management practice for this type of waste. They indicate that the limnology of the HTDF may change over time that could change some of the assumptions and inputs to the current pit modeling. Lorax made recommendations that were included in the 632 permit that will help address long term tailing disposal issues. However, the company must still meet NPDES limits based upon Michigan Water Quality Standards for any pit discharge.***

38. Comment: Do you think it is logical that the tailings and wastewater will actually stay at the bottom of the pit?

Response: ***Lorax Environmental Services from Vancouver, British Columbia concluded in their technical review of the mine tailing disposal process (dated September 1, 2009) that the HTDF is a suitable tailing repository and is considered a best management practice for this type of waste. They indicate that the limnology of the HTDF may change over time so a robust monitoring program within the HTDF along with others relevant recommendations were incorporated into the draft 632 mining permit to help with long term pit surveillance.***

39. Comment: Do you know for sure that the lake water will not turn over seasonally?

Response: ***The state and company have no evidence (in past or present depth/temperature profiles) that the HTDF turns over on a seasonal basis. Any turnover would distribute chemicals in the water column that would be readily detectable by the permittee. These chemicals would linger in the water column for an extended period, certainly long enough to be measured based upon past water collections and lake studies. The 2009 Lorax Report recommended a robust monitoring program be implemented to address future HTDF water column issues.***

40. Comment: Is it enough that Kennecott proposes to only treat the uppermost portion?

Response: ***Yes- The Company will treat the upper portion of the HTDF in order to polish the cleanest pit water and maintain the proper volume and water elevation within the facility. The water intake will be located in shallow water according to Kennecott engineers.***

41. Comment: If you do know this perhaps you could share the temperature profiles and other data and evidence with the public?

Response: ***HTDF profiles have been available to the public in past DNR survey work (MI//DNR/SWQ-91/049), in the Callahan Mining Closure Plan as well as being included by the company in the 632 permit application. Seven locations within the HTDF were used for monitoring purposes by Kennecott and results included within the 632 permit submittal that was made available to the public. The DEQ and company monitored the HTDF together in spring of 2009. Split samples were taken during the HTDF monitoring to independently analyze and verify reported results.***

42. Comment: In the past the DEQ has seen it prudent to execute sampling protocol, GLEAS 51 as well as EPA protocol water sampling of areas of specific

concern before permits were granted. This or third party analysis is quite crucial in maintaining transparency as purported by agency policy.

Response: ***The DEQ has independently sampled several of the river and wetland areas adjacent to the Humboldt facility in the past. DNR 1990 survey work (MI//DNR/SWQ-91/049) and DEQ 2000 (MI/DEQ/SWQ-01/010) monitoring was conducted by DEQ on the Middle Branch Escanaba River at Wolf Lake Road. The 1990 work also included the local wetlands along US-41/28. We plan to discuss the future long term monitoring protocols and locations with Kennecott staff. Submitted and approved plans will include appropriate monitoring protocols.***

43.Comment: Does existing contamination leak from the pit today?

Response: ***Yes, water is currently leaving via the loose overburden at the north side of the HTDF to Wetland EE.***

44. Comment: Only three surface water monitoring sites are planned at the project site. Kennecott claims that these meet R425.203(g) and 406(5)(b) requirements. They do not. The fact is that there are numerous "mining activities" at this site that must be monitored. At a minimum, surface water should be monitored regularly at every point where it leaves the site and as close as practicable to each potential source of pollutant escape.

Response: ***We plan to discuss with Kennecott regarding there future long term surface water monitoring locations around the HTDF. The State of Michigan will review and approve their submitted monitoring plans, only if they met our 632 requirements and comments including collecting protocols and control sites. In addition, the company will be required to prepare a stormwater pollution prevention plan for the mill site.*** **(IS an approved plan required before they get a permit??????) (See Lindsey for help)**

45.Comment: It was so noted in their Aquatic Assessment that several fish were captured in the HTDF some of which are protected by the state, no mention was made about relocation or any effort to preserve any living organism in this facility, and perhaps a small item however tissue samples could have been taken.

Response: ***MDEQ has made the determination that that the HTDF is not considered "waters of the state" and will be used as a mine waste disposal site. As a consequence, the limited fish community will not be protected.***

46.Comment: The current ambient monitoring stations selected by the company should be revisited on a periodic basis over the life of the discharge. To reduce the effects of seasonal variability, ambient monitoring should be conducted in the same season throughout the life of the facility operations. What periodic basis? Every ten years, five years, two days, one hour? Need to be specific.

Response: ***The State of Michigan will review and approve their submitted monitoring plans, if they met our 632 requirements that were included involving collecting protocols, timing, and control sites outside of the influence of the facility. In addition, the company will be required to develop a stormwater pollution prevention plan for the mill site.***

DEQ Water Bureau Responses to Comments (Al LAM)

103 Comment: The NPDES permit does not set limits during operation for constituents that are likely to be, even by Kennecott's own preditions [see Section III(A) of these comments] significantly higher than those allowed by federal water quality standards including but not limited to nickel, copper, selenium, mercury, lead, manganese and sulfate. Each of these is known to occur in high levels in the ore proposed to be processed at Humboldt, yet no limits apply during the WWTP's operation. Section I(A)(e) allows monitoring frequency to be diminished to annual testing for these same constituents after twelve (12) months of data have been submitted to MDEQ. This ignores the fact that the constituents and the waste already in the pit are reactive and have the ability to alter characteristics like acidity and metal content rapidly. Allowing only annual monitoring is irresponsible. Additionally, the plan for meeting water quality standards pivots on the HTDF stratification stabilizing and never changing. This unfounded assumption places wetlands, the Escanaba and Black Rivers and ground water at risk.

Response: ***After a careful review and evaluation of the expected worst-case characteristics of the HTDF upper layer discharge, final discharge limits and/or monitoring requirements have been included in the draft NPDES permit for specific pollutants and whole effluent toxicity to assure that water quality standards will be met and the receiving waters will be protected. The numeric water quality based effluent limits for nickel, copper, selenium, and mercury can be found on page 3 of 23 of the draft permit. It should be noted that draft permit conditions were developed under the assumption that the HTDF will not be permanently stratified. On page 5 of the draft NPDES permit, Part I.A.1.e. (Monitoring Frequency***

Reduction) is a provision included in many permits to allow the Department to reduce the monitoring frequency if appropriate. It should be noted that all such requests are reviewed carefully before any monitoring frequency reductions are approved. Please also note that the monitoring frequency for any of the specified parameters can never be reduced to less than annually and the reduction approvals can be revoked at any time.

104. Comment: This application contains no information regarding the quality of water discharging into the wetlands, so it is currently impossible to predict impacts to surface waters (wetlands and multiple discharges to the Escanaba River and Black River).

Response: ***On pages 9 and 11 of the NPDES application, the applicant provided effluent characteristics of the proposed discharge to the wetland. Limits and monitoring requirements have been established to protect the designated uses of the receiving waters.***

105. Comment: The Lake is now considered "waters of the state" and must be regulated as such. Water quality standards must be met in the Lake, including the mercury standard of 1.3 ng/l. This site does not qualify for variances, and the anti-degradation rule applies to the HTDF discharge.

Response: ***The Department has decided that the HTDF is not waters of the state and consequently is not considered a receiving water. The wetlands adjacent to the HTDF is the receiving water. All water quality standards will be achieved in Kennecott's final effluent before it is discharged to the wetland and no variances are needed or for that matter allowed for that discharge. We agree that Rule 1098 (Antidegradation) applies to the proposed discharge and an antidegradation demonstration that fulfills the requirements of Rule 1098 has been submitted with the application. (Alvin LAM Comment)***

The Humboldt Pit was not considered waters of the state under Part 31, but is a lake under Part 301. Therefore, a Part 301 permit is required. Because Michigan has assumed authority for Section 404 of the Clean Water Act, if a Part 301 permit is issued, it also covers authority for the discharge of fill under Section 404.

110.Comment: The Eagle Project alone will potentially produce over 3 million tons of tailings to be dumped into the Humboldt pit. Kennecotts processing plan includes the use of SIPX, methyl isobutyl carbinol, sodium sulfites, soda ash and Magnafloc 155. We are to assume that these chemicals make up the tailing sludge, but it is not clear in the permit application to what degree.

Response: *All the chemicals identified in the above comment are process chemicals. These are common metal floatation reagents used throughout the mining industry on a worldwide basis. They work by binding to and allowing the metals to be removed in a mechanical process. Most are chemically changed once there "work" is completed, so we expect minor amounts of residual process chemicals to be discharged to the bottom. Our toxicologists have reviewed the products and their respective MSDS information. The WWTP is critical part of the treatment train which cleans the effluent before to be discharged. The current draft NPDES permit requires Kennecott to met a very strict one TUc chronic toxicity limit at the pipe to protect the marsh.*

(I am checking with Vickey to determine with residual information was put somewhere in the application – Bill Taft)